CHAPTER 8

Cabling and Configuring the CES Port Adapter Modules

This chapter describes cabling and configuration procedures for the LightStream 1010 asynchronous transfer mode (ATM) switch circuit emulation service (CES) T1 and E1 port adapter modules (PAMs). When your switch leaves the factory, it is configured as specified in your order and is ready for installation and startup. As your communication requirements change, you might want to upgrade your system, add components, or change the initial configuration.

The following CES T1 and E1 PAMs are described in this chapter:

- CES T1 Twisted-pair Port Adapter Module
- CES E1 Twisted-pair Port Adapter Module
- CES E1 BNC Port Adapter Module

Software and upgrades require specific document part numbers and other frequently updated information; therefore, only basic software configuration guidelines are included in this publication. Detailed, up-to-date instructions are included in the LightStream 1010 ATM Switch Software Configuration Guide and command line interface (CLI) command descriptions are provided in the LightStream 1010 ATM Switch Command Reference.

This chapter contains the following information:

- Overview of the CES Port Adapter Modules
- Connecting the Interface Cables and Checking the LEDs
- Configuring the Interfaces

FCC Part 68 Notice

The port adapter, Model WAI-T1C-4RJ48 used in the ATM/LAN switch complies with Part 68 of the FCC rules. On the bottom of this equipment is a label that contains, among other information, the FCC registration number. If requested, this information must be provided to the telephone company.

This equipment cannot be used on telephone company-provided coin services. Connection to the Party Line Service is subject to State Tariffs.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. If advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make the necessary modifications in order to maintain uninterrupted service.

If trouble is experienced with this equipment, please contact us for repair and warranty information. If the trouble is causing harm to the telephone network, the telephone company may request you remove the equipment from the network until the problem is resolved.

It is recommended that the customer install an AC surge arrestor in the AC outlet to which this device is connected. This is to avoid damaging the equipment caused by local lightning strikes and other electrical surges.

This equipment uses USOC jacks as listed in Table 8-1:

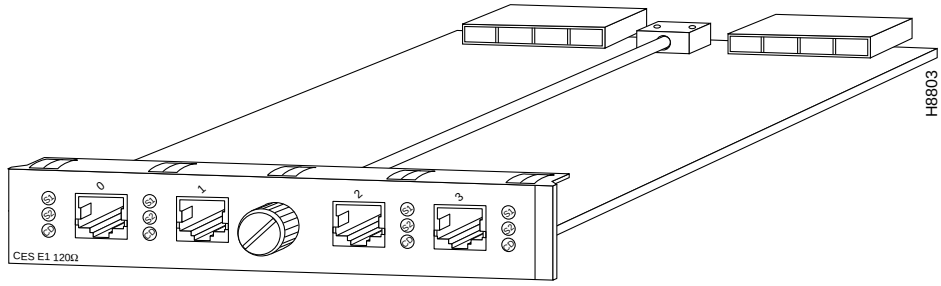
Table 8-1 USOC Jacks for CES Port Adapter Modules

Model Name	Facility Interface Code	Service Order Code	Jack Type
WAI-T1C-4RJ48	04DU9-BN	6.0N	N/A
WAI-T1C-4RJ48	04DU9-DN	6.0N	N/A
WAI-T1C-4RJ48	04DU9-1KN	6.0N	N/A
WAI-T1C-4RJ48	04DU9-1SN	6.0N	N/A
WAI-T1C-4RJ48	04DU9-1ZN	6.0N	N/A

Overview of the CES Port Adapter Modules

The circuit emulation service (CES) T1 and E1 Port Adapter Modules (see Figure 8-1) are ideal for links that require constant bit rate (CBR) services such as interconnecting PBXs, time-division multiplexers, and video conference equipment over campus, public, or private networks. The four ports on the PAM can be configured as redundant links using the switch's routing protocols. The T1 PAMs support UTP connectors and the E1 PAMs support either twisted-pair, STP, or 75-ohm BNC connectors. Status and carrier detect LEDs on each port give quick, visual indications of port status and operation. For detailed network management support, comprehensive statistics gathering and alarm monitoring capabilities are provided.

Figure 8-1 Typical CES T1 or E1 Port Adapter Module (UTP Port Shown)



Each of the ports on the PAM can be configured to support the following clocking options:

- self-timing based on a Stratum 4 level clock
- loop timing from the received data stream—ideal for public network connections
- timing synchronized to a selected master clock port, required in order to distribute a single clock across a network

The plug-and-play mechanisms of the LightStream 1010 allows the switch to come up automatically. All configuration information for port adapter modules can be saved between hot swaps and switch reboots, while interface types are automatically discovered by the switch. This eliminates mandatory manual configuration.

The LightStream 1010 supports any combination of port adapter modules. Customers can configure their switches with only the number and type of interfaces required, with up to 32 CES T1 or CES E1 interface ports.

This section describes the following:

- CES T1 and E1 PAM Features
- CES T1 and E1 PAM Applications

CES T1 and E1 PAM Features

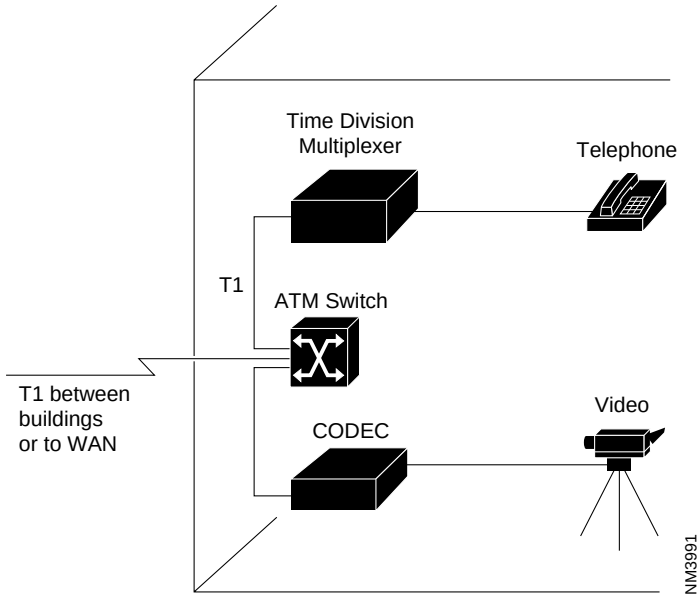
The CES T1 and E1 PAMs provide the following features:

- 4-port T1 or E1 CBR port adaptor module (PAM)
- Structured and unstructured CBR processing
- Adaptive, Synchronous Residual Time Stamp (SRTS), and synchronous clocking for CBR traffic
- Clear Channel and Channelized with CAS signaling on CBR ports
- On-line Insertion and Removal
- Clear Channel Circuit Emulation
- IOS CLI (Command Line Interface)
- Global network clock synchronization (Nettime)
- Dynamic ATM addressing for CBR channel-groups

CES T1 and E1 PAM Applications

The CES T1 and E1 Port Adapter Modules have four ports and are ideal for intercampus or wide-area links. Figure 8-2 is an example of the CES T1 and CES E1 PAM applications.

Figure 8-2 CES T1 and E1 Port Adapter Module Applications



The CES T1 or CES E1 PAM provides the following ATM connections:

- Interconnecting PBXs
- Time-division multiplexer connections
- Video conference connections

Connecting the Interface Cables and Checking the LEDs

All CES interfaces are bidirectional. You must use the appropriate CES interface cable to connect the CES BNC or twisted-pair PAM interface with an external CES network.

This section describes the following:

- CES Connection Equipment
- Connecting the Interface Cables and Checking the LEDs

CES Connection Equipment

For CES traffic over twisted-pair, use the RJ-48C connect to connect the CES T1 PAM or CES E1 PAM to the external CES network. See the section “Preparing Network Connections” in the chapter “Preparing for Installation” for a description of an RJ-48C connector and twisted-pair and shielded twisted-pair cable.

For coaxial traffic, use the BNC connector to connect the CES E1 PAM with the external CES network. See the section “Preparing Network Connections” in the chapter “Preparing for Installation” for a description of a BNC connector and coaxial cable.

CES T1 and E1 PAM Network Connections and LEDs

The CES T1 and CES E1 PAMs provide an interface to CES switching fabrics for transmitting and receiving data at up to 1.544 Mbps (T1) and 2.048Mbps (E1) bidirectionally. The PAM LEDs provide status information for the port adapter module’s individual interface connections.

Caution T1 and E1 port must be connected to an NT1 device.

CES Network Connections

All CES T1 and CES E1 interfaces are bidirectional. You must use the appropriate CES interface cable to connect the CES T1 or CES E1 PAM with an external CES network.

The CES PAM can support interfaces that connect to the following physical layers:

- E1 G.703 with HDB3 coding
- E1 2.048 Mbps coaxial cable

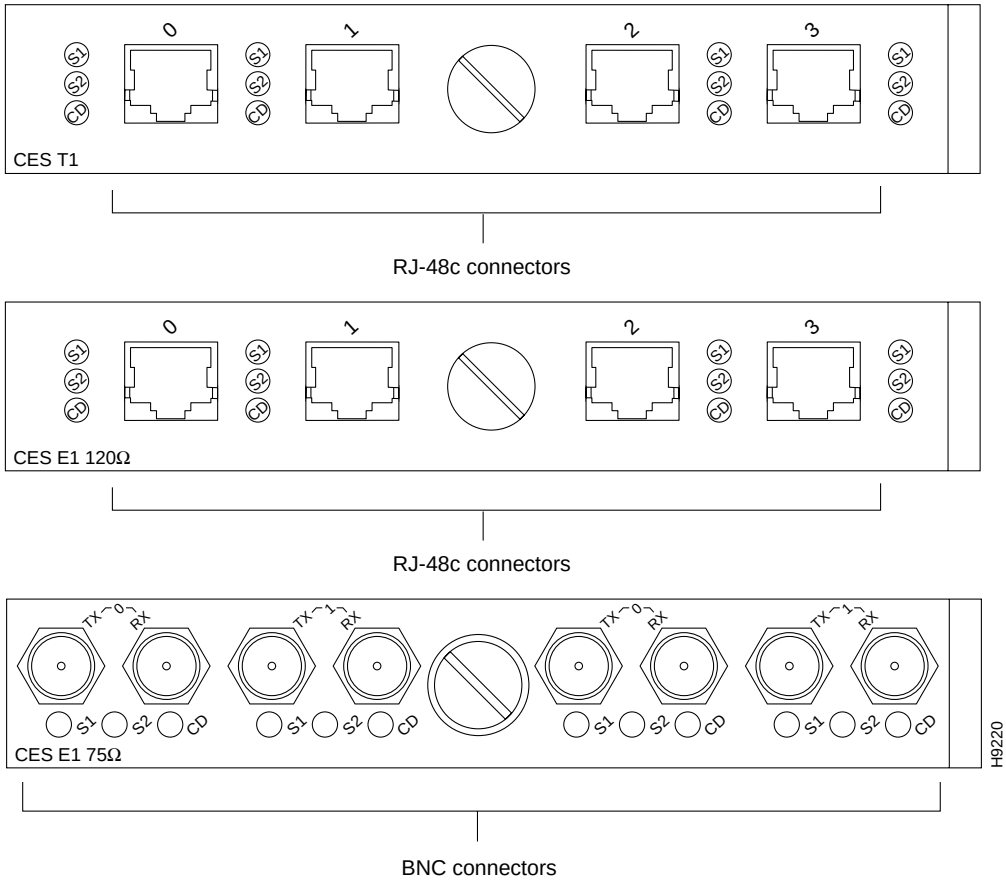
Connect the CES interface cables as shown in Figure 8-3. For detailed descriptions of ATM cabling requirements, refer to the sections “Distance Limitations” and “ATM Connection Equipment” in the chapter “Preparing for Installation.”

CES T1 and E1 Module LEDs

This section describes the LEDs on the faceplate of the CES modules, shows their possible illumination states, and defines the operational status of the associated ports, given certain illumination patterns of the LEDs.

The LEDs provide status information for the port adapter module’s individual BNC and twisted-pair interface connections. The LEDs are shown in Figure 8-3.

Figure 8-3 CES T1 and E1 Connections and LEDs



The LEDs for the CES T1 and CES E1 modules exhibit the illumination states shown in Table 8-2.

Table 8-2 LED Illumination States of CES T1 or CES E1 PAMs

Port LEDs	Illumination States
S1 (status1)	Steady green, red, or yellow; flashing green, red, or yellow; or off.
S2 (status2	Steady green, red, or yellow; flashing green, red, or yellow; or off.
CD (carrier detect)	Either on (green) or off.

Table 8-3 shows the possible status conditions of a CES T1or CES E1 port, as indicated by certain settings of associated port LEDs.

Table 8-3 Port Status Conditions Indicated by CES T1 or CES E1 LEDs

Port Status Indication	S1 LED State	S2 LED State	CD LED State
Port not configured	Off	Off	Off
Port administratively down	Off	Off	Off
Normal	Green	Green	Green
Red alarm due to framing error	Red	Red	Off
Red alarm due to loss of cells	Red	Red	Green
Yellow alarm	Yellow	Off	Green
Blue alarm	Off	Yellow	Green
Port in loop state	Flashing green	Flashing green	Green

Note During alarm integration, the indicated LEDs will flash the “upcoming” or “next” state combination indicated in Table 8-3. For example, when the line conditioning state machine is notified of loss of signal (LOS), it will cause S1 and S2 to flash red, since a continued LOS will put the port in the red alarm state.

Configuring the Interfaces

When the switch is powered on initially without any previous configuration data, the ATM interfaces are automatically configured on the physical ports. ILMI and the physical card type are used to automatically derive the ATM interface type, UNI version, maximum virtual path identifier (VPI) and virtual channel identifier (VCI) bits, ATM interface side, and ATM UNI type.

Default ATM Interface Configuration Without Autoconfiguration

If ILMI has been disabled or if the connecting end node does not support ILMI, the following defaults are assigned to all CES T1 and CES E1 interfaces:

- ATM interface type = UNI
- UNI version = 3.0
- Maximum VPI bits = 8
- Maximum VCI bits = 14
- ATM interface side = network
- ATM UNI type = private
- Loopback = no loop
- Signaling mode = no signaling
- Clock-source = network derived
- Data format = clear channel
- Timing = synchronous
- Line build out = 0 to 110 feet
- Cell delay variation = 2,000 microseconds
- Channel associated signaling = false
- Partial fill = 47

The following PAM types have specific defaults assigned:

CES T1 PAM:

- Framing = ESF
- Line coding = B8ZS
- Line state = no alarm

CES E1 PAM:

- Line type = E1
- Line coding = HDB3
- International bits = 0x3
- National bits = 0x1f
- Multi-frame spare bits = 0xb

The following defaults apply for all versions of the CES modules, unless you change them manually by means of specific CLI commands issued during module configuration:

- **CES-IWF AAL1 service unstructured**—This default setting automatically establishes unstructured (clear channel) CES services for a CES module.
- **CES-IWF AAL1 clock source synchronous**—This default setting automatically establishes synchronous clocking for all CES-IWF operations.

Note You can accept the default ATM interface configuration or overwrite the default interface configuration using the CLI commands. These commands are described in the *LightStream 1010 ATM Switch Software Configuration Guide*, which provides detailed ATM interface configuration tasks.

This concludes the explanation of the CES T1 and CES E1 port adapter module cabling and configuration.